California Water Plan Update 2010

New Investments in Water Portfolios

California Water and Environmental Water Forum
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Overview of New Investments

- Water Portfolios Review
- Water Balance Development
- Water Use Application Development
- Vision

What are Water Portfolios?

Water Portfolios represent actual year water conditions

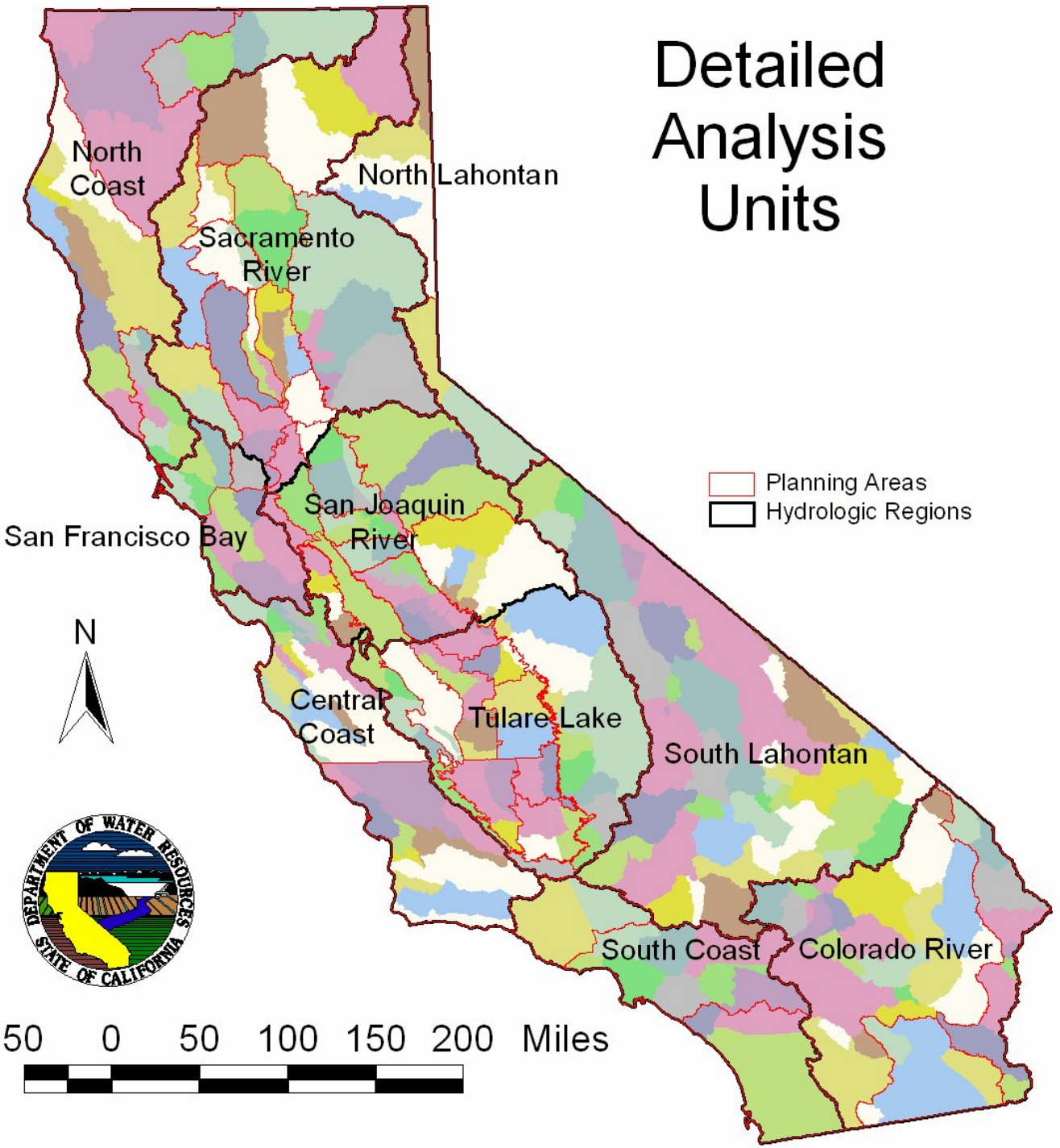
- Flow Diagram
  - Tracks the disposition (e.g. ocean, inland salt sink, atmosphere, storage) of all sources of water (e.g. precipitation, regional imports)
- Water Balances
  - Inflow-Outflow, Applied Water Use, Net Water Use, and Depletion
- Data Tables
  - Time series and other data showing historic trend information
- Narratives
  - Document hydrologic conditions, events, and management decisions
- Water Quality
  - Integrate water quality parameters to characterize water conditions

Water Portfolio Data

- How many of you have used Water Plan Update data?
  - Agricultural Data (ET, EP, ETAW, CF, AW)
  - Urban Data (Per-Capita Water Use)
  - Managed Wetlands Data (ET, ETAW, AW)
  - Water Supplies (SW, GW, Reuse, Recycled)
  - Deep Percolation Estimates

Update 2010

- Water balances for each Detailed Analysis Unit by County



Water Balance Development

- Mass balances are difficult to apply
  - Limited data and staff resources to develop:
    - Rainfall-runoff and natural deep percolation recharge
    - Native vegetation ET
    - Stream accretion and depletion
    - Groundwater change in storage and lateral flow
- Apply Inflow-Outflow to Uses
  - Limit analysis to surface and rootzone
  - Develop applied water and consumptive use of applied water estimates
  - Determine the disposition of applied water
  - Use actual supply data or estimated diversions

Inflow-Outflow Method

- Determine actual year uses and balance with supplies
  - Account for disposition of all uses, conveyance characteristics, deep percolation, reuse, etc.
  - First - balance each sector of use
  - Second - balance all sectors together, accounting for the movement of water between sectors, for example:
    - Urban WWTP discharge to drains for agricultural use, otherwise known as reuse
    - Agricultural return flows used by managed wetlands
    - Applied water, net water use, and depletion checks for estimating reuse, conveyance seepage, and deep percolation
  - Improve water routing linkages within and between DAU-County analysis areas

Method

- Supplies
- Drain Water
- Reuse
- Reuse between sectors
- Depletions
- Deep percolation
- Intentional GW recharge
- Outflow
- Change in surface storage

Developed Water Use Balance
Thousand Acre-Feet

Year:	1999	Scenario Type:	Actual Year	
Detailed Analysis Unit (DAU) No. :	163	DAU Name:	Willows-Arbuckle	
County No. :	06	County Name:	Colusa	

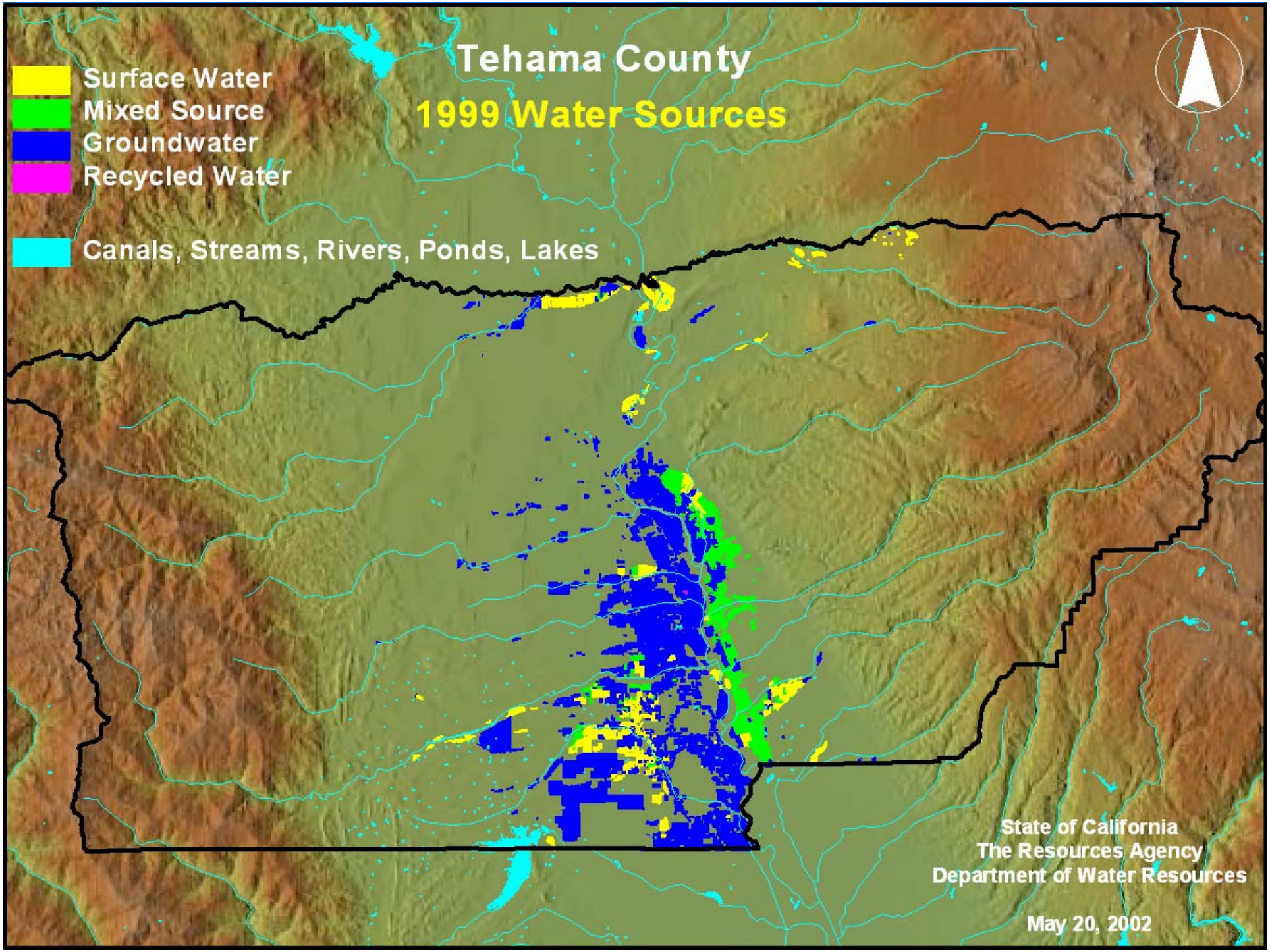
		Agriculture	Managed Wetland	Urban	Total
USE OF WATER SUPPLY	Local Surface Water	3.0	0.0	0.0	3.0
	Local Import		0.0		0.0
	Ground Water - Unadjudicated	78.8	7.7	2.6	89.1
	Ground Water - Adjudicated		0.0		0.0
	Ground Water - Banked		0.0		0.0
	Colorado River		0.0		0.0
	State Water Project		0.0		0.0
	Central Valley Project - Base	419.1	26.6		445.7
	Central Valley Project - Project	141.5	48.2		189.7
	Other Federal		0.0		0.0
	Ocean Desalination		0.0		0.0
	Water from Refineries		0.0		0.0
	Water Transfers		0.0		0.0
	Inter-basin Water Transfers		0.0		0.0
	Sub-Total (Prime Supply)	642.4	82.5	2.6	727.5
	Inflow Drain Water				
	From Other DAUs within County and PA	0.0	0.0		0.0
	From Same DAU, out of County, within PA	80.6	7.5		88.1
	Carry-over Storage from Previous Water Year	44.4	15.0		59.4
	Total Use of Water Supply	767.4	105.0	2.6	875.0
REUSE	Reuse *Not Included in Total Reuse of Supply*	88.4	23.5		
	Reuse - Wastewater Recycling *Not Included in Total Reuse of Supply*				
	Reuse - Desalination *Not Included in Total Reuse of Supply*				
	Reuse Between Sectors				
	Reuse of Agricultural Supply *[Sector Balance Only]*		0.0	0.0	
	Reuse of Managed Wetlands Supply *[Sector Balance Only]*	0.0		0.0	
	Reuse of Urban Supply *[Sector Balance Only]*	0.6	0.0		
	Total Reuse of Supply from Other Sectors	0.6	0.0	0.0	
DEPLETION	ETAW				
	Evapotranspiration of Applied Water	454.1	40.1	1.2	495.4
	Evaporation & Evapotranspiration of Applied Groundwater Recharge	0.0	0.0	0.0	0.0
	Evaporation and Evapotranspiration of Wastewater			0.1	0.1
	Other Consumptive Losses				
	Conveyance System Evaporation & Evapotranspiration	2.8			2.8
	Conveyance System Evaporation & Evapotranspiration		0.0		0.0
	Conveyance System Evaporation & Evapotranspiration			0.0	0.0
	Drainage Losses				
	Riparian ET	9.6			9.6
	Riparian ET		0.0		0.0
	Riparian ET			0.0	0.0
	Miscellaneous Agricultural Evapotranspiration	6.6			6.6
	Miscellaneous Managed Wetland Evapotranspiration		1.2		1.2
	Total Depletion	473.1	41.3	1.3	515.7
DEEP PERC	*Conveyance*				
	Conveyance Seepage [not included in Balance]	67.4			
	Conveyance Seepage [not included in Balance]		9.1		
	Conveyance Seepage [not included in Balance]			0.0	
	Conveyance Deep Percolation	22.6			22.6
	Conveyance Deep Percolation		0.0		0.0
	Conveyance Deep Percolation			0.0	0.0
	Deep Percolation of Applied Water				
	Deep Percolation of Applied Surface Water	8.3	0.1	0.0	8.4
	Deep Percolation of Applied Groundwater	7.8	0.1	0.7	8.6
	Deep Percolation of Groundwater Recharge	0.0	0.0	0.0	0.0
	Total Deep Percolation	38.7	0.2	0.7	39.6
OUTFLOW	*Return Flows to Developed Supply*				
	To Other DAUs within County within PA	13.0	4.7		17.7
	To Same DAU, Out of County within PA	26.7	9.1		35.8
	To Other DAU, Out of County within PA	0.0	0.0		0.0
	Out of PA	129.1	45.9		175.0
	Out of HR	0.0	0.0		0.0
	Conveyance Return Flows to Developed Supply				
	To Other DAUs within County within PA	2.8			2.8
	To Other DAUs within County within PA		0.4		0.4
	To Other DAUs within County within PA			0.0	0.0
	Outflow to Other Sector of Use within DAU/County				
	Outflow as Reuse to Agricultural Sector			0.6	
	Outflow as Reuse to Managed Wetland Sector				
	Outflow as Reuse Outflow to Urban Sector				
	Total Outflow	196.8	63.5	0.6	260.3
	Change in Surface Storage (Drainage Carry-over to Next Water Year)	59.4	0.0	0.0	59.4
	DAU/County Balance Condition: BALANCED	0.0	0.0	0.0	0.0

Inflow-Outflow Method Refinement

- Understanding reuse
  - Very common with the rice and managed wetland areas of the Sacramento Valley
    - Goal is to map privately managed wetland land use
  - Supply = Applied Water – Reuse + Conveyance

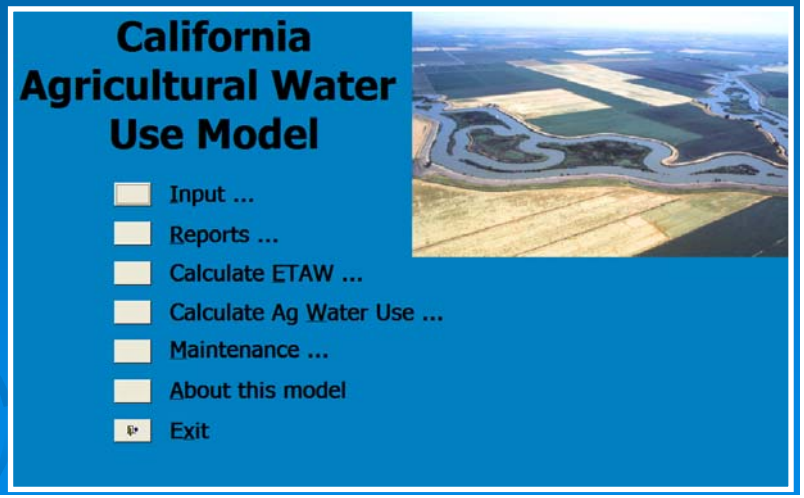
Water Supplies

- Water supplies defined by sector of use
  - Agricultural, urban, Managed Wetlands
- Estimating agricultural groundwater pumping
  - Water source mapping by field for Northern Sacramento Valley is the basis for Land Use based Groundwater extraction estimates
  - Elsewhere, goal is to differentiate, where possible, the use of surface water and groundwater by field or regionally to refine estimates of land use based groundwater estimates


Tehama County
1999 Water Sources
Surface Water
Mixed Source
Groundwater
Recycled Water
Canals, Streams, Rivers, Ponds, Lakes
State of California
The Resources Agency
Department of Water Resources
May 20, 2002

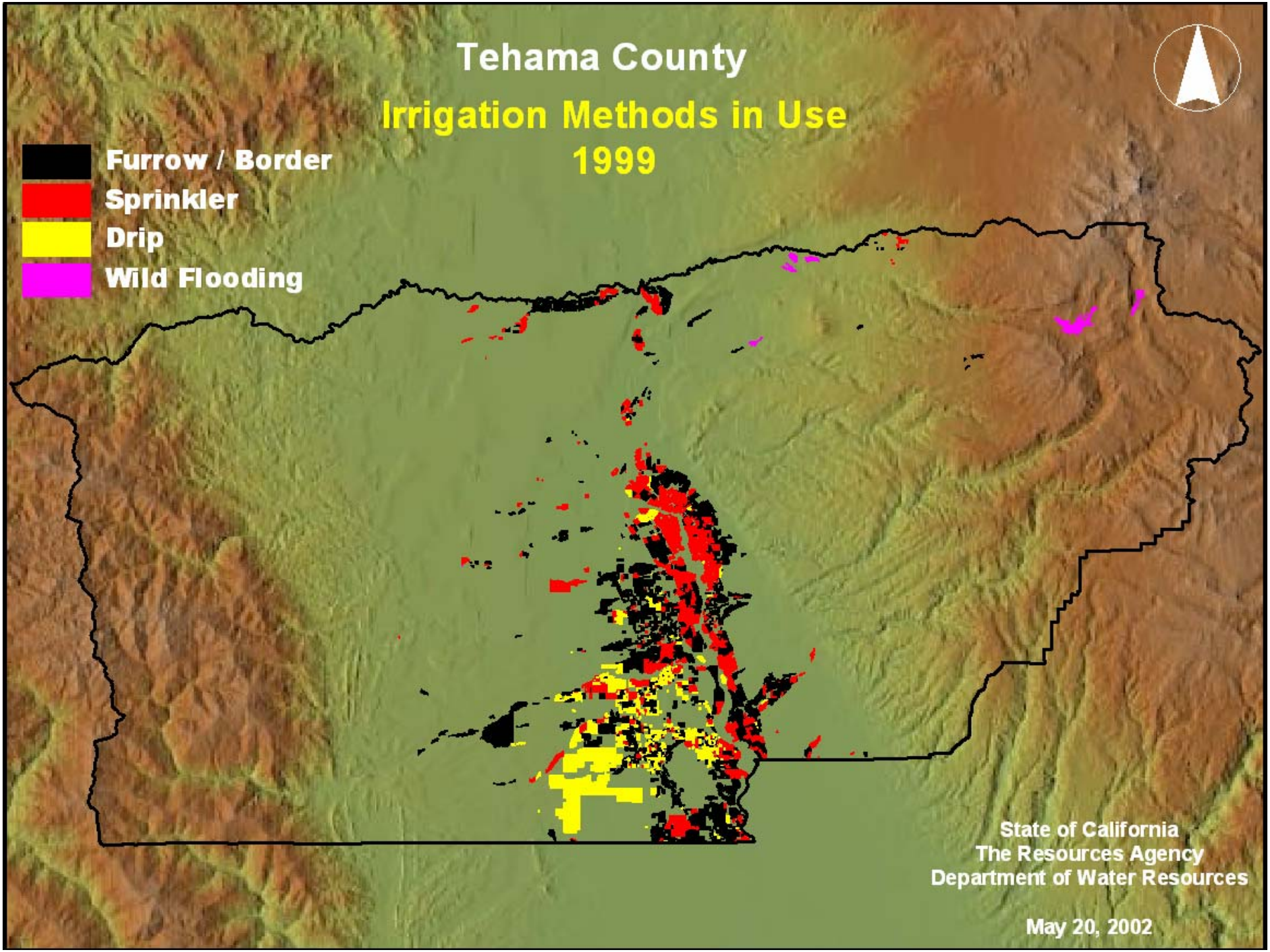
Agricultural Water Use Initiative

- California Agricultural Water Use Model
  - Monthly time-step water use calculations
  - Daily precipitation/infiltration preprocessor
    - SCS Method
  - Soil moisture balance methodology
    - Uses SCS Soil Survey data
  - ET, EP, ETAW
  - Estimates of precipitation deep percolation



Agricultural Water Use Initiative

- Applied Water – Uses farm data
  - Compute consumed fractions (ETAW/AW) from:
    - Application fractions, cultural practices, rice decomposition, rice ponding, winter ponding (duck clubs), etc.
- Collect irrigation methods
- Expand model to aggregate data from smaller units than a DAU/County
  - Cover water districts, grouping of water service areas or unorganized areas, etc.

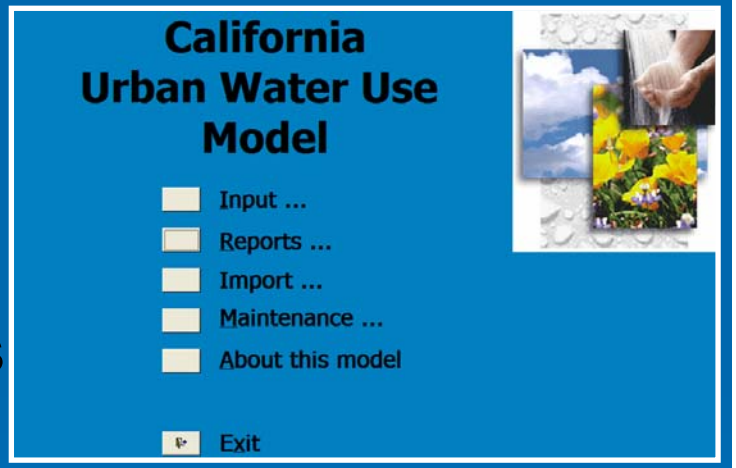

Tehama County
Irrigation Methods in Use
1999
Furrow / Border
Sprinkler
Drip
Wild Flooding
State of California
The Resources Agency
Department of Water Resources
May 20, 2002

Wetlands Water Use Initiative

- Managed Wetlands Model *(to be developed)*
  - Develop database application as module of Ag Water Use Model
    - Currently a spreadsheet analysis by refuge or privately managed wetland grouping
    - Monthly time-step with daily precipitation processor
    - Determines land use based ETAW, ET, AW by habitat type
  - Refine flood-up, drawdown, seepage, deep percolation, irrigation requirements, ponding, circulation flow, ponding depths, outflow

Urban Water Use Initiative

- California Urban Water Use Model
  - Developing database application
  - Monthly time-step
  - Indoor/Outdoor Use
  - Water use by supplier type
    - Public Water Supply systems
    - Self-supplied water users
      - Industrial, small communities, golf courses
    - Estimate water uses for unorganized areas
  - Water use by customer class
    - Single Family Residential, Multi-Family Residential, Commercial, Industrial, Large Landscape



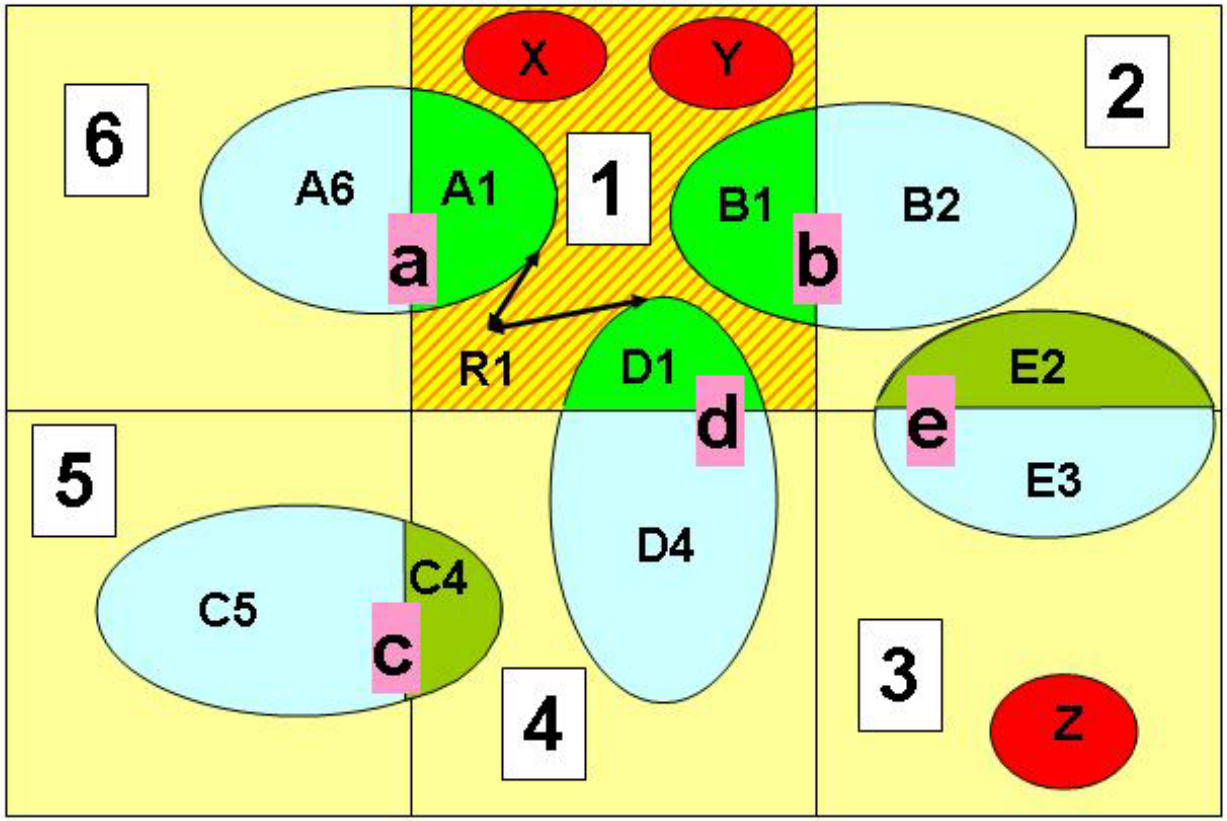
Urban Water Use Initiative

- California Urban Water Use Model
  - Water balance to evaluate disposition of uses and store associated datasets, including
    - Wastewater Treatment data, NPDES permits
    - Estimates of septic tanks usage
    - Landscape acreage and irrigation (AW, ETAW)
    - Deep Percolation
    - Recycled water
    - Reuse

Aggregate smallest units of analysis

Urban Water Use

Schematic



1 DAU-County

A / a Public Water System (PWS)

A: population
a: per capita water use

A1 PWS Sub Group

X Self Supply Users

R1 Residual Self Supply User Group

Example Calculation: Total Single Family Water Use, WU(SF), in DAU-County 1

WU(SF) = A1*a(SF) + B1*b(SF) + D1*d(SF) + X*x(SF) + Y*y(SF) + R1*r1(SF)

Where a(SF) is single family per capita water use of A. The rest terms are interpreted similarly.

A1+B1+D1+X+Y+R1 = total population in DAU-County 1;

Population by Public Water Systems are: A1 + A6 = A; B1 + B2 = B; D1 + D4 = D

Vision

- Determine useful analysis areas
  - DAU-County?
  - Watershed?
  - Water district or water agency?
  - Groundwater basin?
  - How will the data fit with Integrated Regional Water Management Planning?
- Evaluate detail needed for modeling and scenario evaluation

Questions?

Visit the California Water Plan Website

www.waterplan.water.ca.gov